

PROGRESS REPORT: 4/06-3/07

Forecasts that Communicate: Assessment, Development, and Delivery of Probabilistic Forecasts that Foster Easy, Accurate, and Reliable Interpretation

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Project Description

The primary objective of this project is to improve the ease, accuracy, and reliability with which seasonal forecast products are interpreted. Supporting objectives are to:

- Foster ongoing, iterative relationships between research, operational forecasting, and water management communities.
- Enable the efficient provision of customizable forecast formats by operational forecasters or information intermediaries (e.g., extension agents).
- Provide feedback tools to the operational forecasting and social science community to track forecast formats and elements preferred by diverse stakeholders.
- Improve water managers' perceptions of climate forecast credibility, through more accurate understanding of the contents of forecast products.

Our project focuses on two components. The first is to quantitatively assess multiple forecast formats for easy, reliable, and correct interpretation. From this effort we hope to identify specific product elements that consistently improve (or confound) forecast communication, which can then be applied to (or eliminated from) a broad range of forecast products. The second component of our proposed work is the implementation of dynamically interactive Internet-based webtools that will allow users to customize a forecast product to best fit their cognitive style, technical capabilities, and decision making needs.

Project Activities

During this reporting period, we used the findings from the prior period to influence the development of new seasonal forecast products.

Earlier in the project period, we began working with the Climate Services Division (CSD) of the Office of Weather, Water, and Climate Services, National Weather Service (NWS) in training NWS Weather Forecast Office (WFO) personnel about forecast interpretation and communication, as part of the CSD Climate Operations Training Course. Material in that course was based in part on findings from the surveys and

interviews in this project.

Further, based on our surveys results from the prior period, CSD requested assistance in the design of their experimental Local 3-Month Temperature Outlook (L3MTO). We worked with the L3MTO design team, including their website development contractors, to develop multiple formats of the local version of the Climate Prediction Center (CPC) seasonal climate outlook. In particular, our work resulted in using a pie chart format, two versions of a simplified probability of exceedance plot, tabular formats that allowed users to specify a confidence interval and obtain a corresponding range of forecast values, and text forecasts that required no interpretation on the part of users. An experimental version of one format is shown in Figure 1.

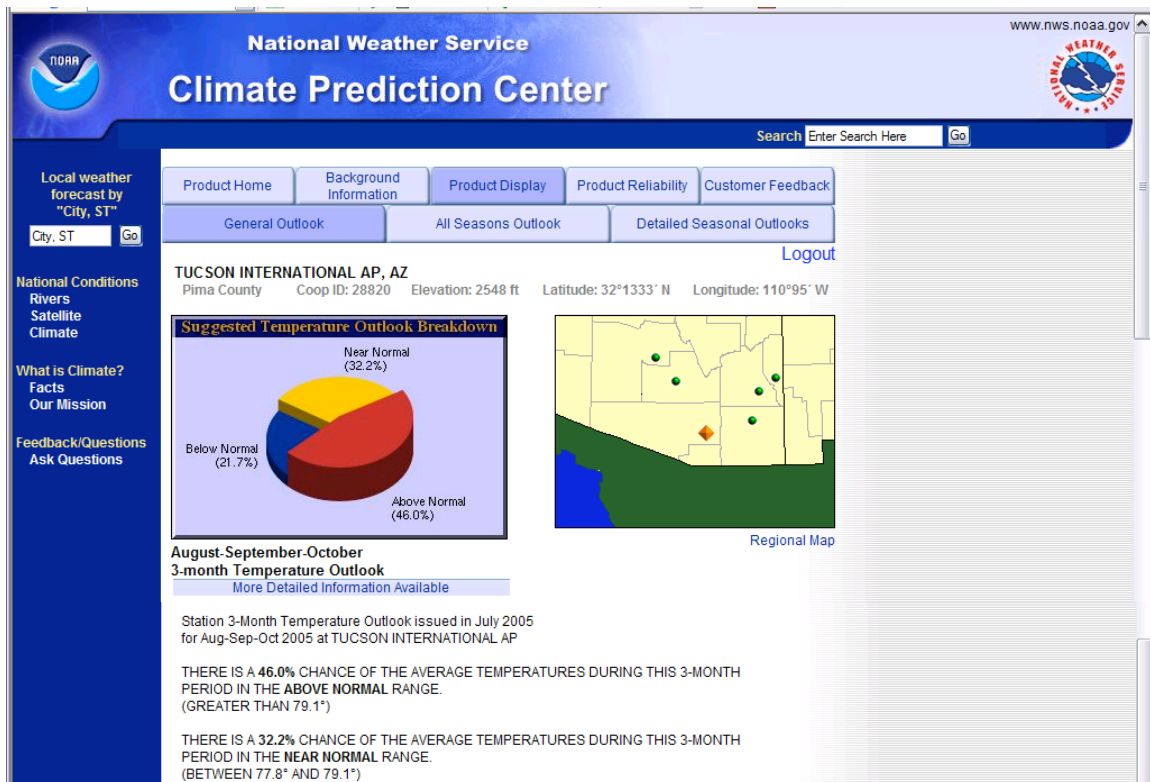


Figure 1. Experimental version of NWS Local 3-Month Temperature Outlook using pie chart and quantitative text statements.

We were unsuccessful in translating our research findings into the L3MTO product completely, however. In particular, although the surveys and interviews revealed that use of the terms “above normal”, “near normal”, and “below normal” consistently lead to confusion and misinterpretation, without clear evidence of the superiority of alternative language, CSD was unwilling to change the product language. The same perspective exists concerning the replacement of “equal chances”, in situations where no skill has been demonstrated by any forecasting technique, with alternative language, e.g., “indeterminate”.

Department of Commerce (DOC) policy limitations prohibited the development of dynamically interactive products as originally conceived for this project. Thus, our efforts to implement dynamic forecast formatting tools focused on supporting the CSD contractor through periodic reviews of approach and outcomes, and continued development of our University of Arizona Climate Information Delivery and Decision Support System (CLIDDSS). The underlying architecture of CLIDDSS was significantly modified to provide for incorporation of proprietary products without having to incorporate security features that threatened to require all project resources.

Key Results:

- Close working relationship with CSD enabled implementation of research findings into experimental forecast products, with potential for becoming operational products.
- The experimental products include multiple formats for communicating forecast information, with the formats designed to reduce common misinterpretation problems.

Key Findings:

- DOC policies significantly limit the potential for developing dynamic forecast products with user-controlled formats and interpretation assistance.
- While NWS personnel recognize that use of specific terms leads to misinterpretation of forecast information, they are reluctant to discard terms having a long tradition of use without significant evidence of the clear superiority of alternative language.

Recommendations:

- Adaptation of federal information technology policy is required to enable dynamic forecast format capabilities.

Reporting and Technology Transfer

During this period, we reported on project results in the following presentations

(*=invited presentations):

Hartmann, H.C., 2007. Misinterpretation of probabilistic seasonal climate outlooks by resource management professionals. 35th Conference on Broadcast Meteorology/87th Annual Meeting, American Meteorological Society, San Antonio, TX, 15-18 January.

*Hartmann, H.C., 2006. Packaging climate products for users. Climate Diagnostics and Predictions Workshop, NOAA, Boulder, CO, 23-27 October.

*Hartmann, H.C., 2006. Understanding CPC Seasonal Outlooks. Operational Climate Services Residential Training Courses, National Weather Service, Kansas City, MO, 13-15 June.

*Hartmann, H.C., 2006. Climate and society: working with a nation of stakeholders. Congressional Staff Symposium, From Knowledge to Action: Making Use of Climate Predictions, University Consortium on Climate Research, Washington, DC, 4 May.